

Earth Sciences Final Exam Study Guide 2018

1. Scientific Method

- a. Constructing a Hypothesis
- b. Designing an experiment to test a Hypothesis
- c. Accuracy vs. Precision
- d. Data collection, recording, interpretation and presentation
- e. Conclusion and future work

Scientific Bias

2. Lab Safety

3. Scientific Law vs. Theory

4. Creation of the Universe

- a. Big Bang Theory
- b. Nebular Hypothesis
- c. Creation of our Solar System
- d. Formation of gas giants and dwarf planets
- e. Formation of rocky planets
- f. Mercury vs. Venus
- g. Formation of early Earth
 - i. Planetary differentiation
 - ii. Solid Inner core
 - iii. Molten Outer core
 - iv. Molten Mantle

5. Density

- a. Convection cells
- b. Crust - composition

6. Origin of Elements

- a. Small Stars - light elements
- b. Super Nova - heavy elements
- c. States of Matter
- d. Solid
- e. Liquid
- f. Gas
- g. Plasma

7. Periodic table of Elements

- a. Elements in the periodic table
- b. Structure and properties of the atom
- c. Protons, Neutrons, Electrons
- d. Atomic number vs. atomic mass number
- e. Atomic Bonding
- f. Why atoms bond?

8. How does bonding affect the chemical properties of an element or mineral?

- a. Types of Bonding
- b. Covalent
- c. Ionic

- d. Metallic

9. Continental Drift

- a. Plate tectonics
- b. Sea-floor spreading
 - i. Divergent plate boundary oceanic-oceanic e.g. Mid-Atlantic Ridge
 - ii. Divergent plate boundary continental- continental e.g. African Rift Valley
 - iii. Convergent plate boundary continental oceanic e.g. South America - Nazca Plates
 - iv. Convergent plate boundary continental continental e.g. Indian - Eurasian Plate
 - v. Transform plate boundary e.g. San Andreas

10. Volcanoes

- c. Basic structure of a volcano
- d. Types of volcanoes
 - i. Shield
 - ii. Cinder-cone
 - iii. Strato-volcanoes
 - iv. Fissure
 - v. Hot spot

11. Other features

- a. Hot springs

- b. Geysers
- c. Fumaroles

12. Uses of volcanos

- a. Hydrothermal energy
- b. Industry
- c. Construction
- d. Eco-tourism
- e. Diamonds

13. Faults (Brittle deformation)

- a. Anatomy of a fault
- b. Normal
 - i. Tension - Hanging wall moved down
- c. Reverse
 - i. Compressional - Hanging wall moves up
- d. Strike-Slip

14. Earthquakes

- a. Causes of Earthquakes
- b. Elastic Rebound Theory
 - i. Where Earthquakes occur
 - ii. Epicenter vs. focus
- c. Identifying the location of Earthquake
- d. Triangulation

- e. S waves, P waves and Love waves
- f. Seismograph
- g. How earthquakes taught us about the structure of the inside of Earth.

15. Folding (Ductile deformation)

- a. Anatomy of a fold
 - i. Anticline
 - ii. Syncline
 - iii. Recumbent
 - iv. Overturn

16. Stratigraphy

- a. Laws
 - i. Original Horizontality
 - ii. Superposition
 - iii. Cross cutting
 - iv. Included fragments
- b. Keybeds
- c. Outcrops
- d. Unconformities
 - i. Disconformity (Sedimentary rock layers separated by an erosional surface)
 - ii. Nonconformity (Sedimentary rock - metamorphic/ igneous rocks)

- iii. Angular unconformity (rock layers tilted then new sediments deposited horizontally on top of them).

e. Relative dating

- i. Matching rock layers
- ii. Correlation

f. Absolute dating

- i. Half life
- ii. Parent daughter isotopes
- iii. Alpha Decay
 - 1. Uranium 238
 - 2. Thorium 230
- iv. Beta Decay
 - 1. Radiocarbon (C-14)
 - 2. Nitrogen

17. Uniformitarianism - present key to the past

18. Minerals

- a. Identification
- b. Crystal structure
- c. Streak
- d. Cleavage
- e. Luster
- f. Transparency

- g. Etc.

19. Rock cycle

- a. Igneous
 - i. Extrusive
 - ii. Intrusive
- b. Sedimentary
 - i. Bioclastic
 - ii. Clastic
 - iii. Solution
- c. Metamorphic
 - i. Foliated
 - ii. Non foliated
 - iii. Contact
 - iv. Regional

20. Water cycle

- a. Evaporation
- b. Condensation
- c. Precipitation
- d. Infiltration
- e. Runoff
- f. Transpiration
- g. Porosity

- h. Permeability

21. Weathering (breaking down of rock)

- a. Chemical

- i. Dissolution
- ii. Evaporation
- iii. Precipitation
- iv. Oxidation
- v. Reduction

- b. Physical

- i. Wind (abrasion)
- ii. Water - Ice wedging

- c. Biological

- i. Plants
- ii. Animals including man

22. Erosion (transportation of rock)

- a. Wind

- b. Water

- i. Liquid (Rivers and Oceans)
- ii. Frozen (Ice-sheets)

- c. Gravity

23. Fossils

- a. Trace fossils

- i. Trails/ tracks
 - ii. Burrows
 - iii. Coprolites
- b. Body fossils
- c. Petrified wood
- d. Insects in Amber
- e. Original body parts
- f. Molds
- g. Casts
- h. Carbon films

24. Geological timescale

- a. Major events in Earth History
 - i. Permian - Largest mass extinction
 - ii. Details on the Permian mass extinction
 - 1. Siberian traps – temperature
 - 2. Methane in the permafrost
 - 3. Hydrogen sulfide and the Ozone layer
 - iii. Carboniferous – Role that trees played in moderating climate
 - iv. Devonian - Amphibians. Diversification of fishes
 - v. Silurian - Vascular land plants and corals
 - vi. Ordovician - Mass extinction - Gondwana drifted south – Ice age
 - vii. Cambrian - Diverse life in the oceans. Primitive fish and Pika

25. The Atmosphere

- a. Layers of the atmosphere
- b. Properties/ role of each layer
- c. Greenhouse effect
- d. Global Warming (Carbon dioxide, methane)
- e. Chlorofluorocarbons
- f. The ozone layer

26. Climate

- a. Climate change
- b. Natural vs. manmade climate change
- c. Contributions of the developed vs. developing world
- d. Who should pay to fix the problem?